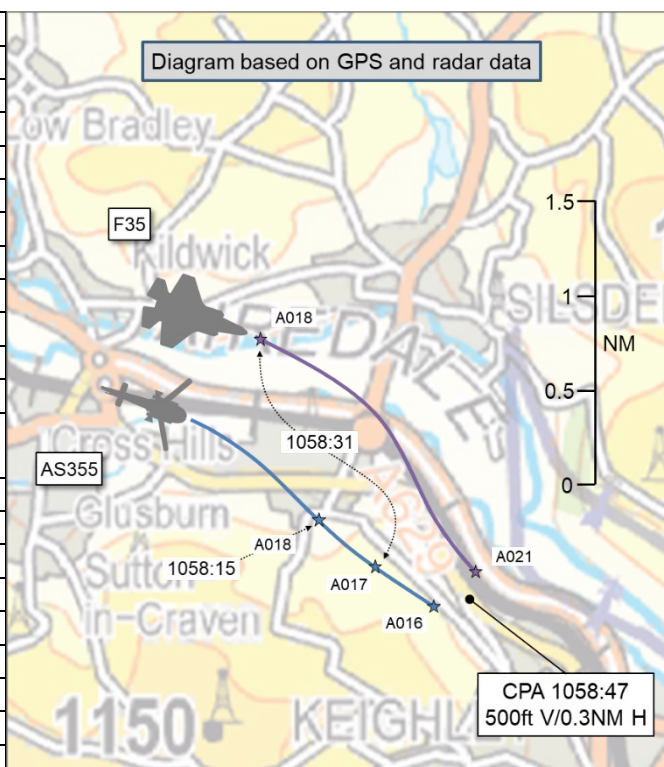


**AIRPROX REPORT No 2023222**

Date: 22 Sep 2023 Time: 1059Z Position: 5353N 00156W Location: 1NM NW Keighley

**PART A: SUMMARY OF INFORMATION REPORTED TO UKAB**

Recorded	Aircraft 1	Aircraft 2
Aircraft	AS355	F35
Operator	Civ Comm	Foreign Mil
Airspace	London FIR	London FIR
Class	G	G
Rules	VFR	IFR
Service	Basic	Listening Out
Provider	Leeds Radar	Low Level Common
Altitude/FL	1600ft	2100ft
Transponder	A, C, S	A, C
<b>Reported</b>		
Colours	Black, yellow	Grey
Lighting	Anti-col, position, strobes, HISL	Nav, HISL
Conditions	VMC	IMC
Visibility	>10km	NR
Altitude/FL	1600ft	NR
Altimeter	QNH (998hPa)	RPS
Heading	130°	NR
Speed	80kt	450kt
ACAS/TAS	TCAS I	Other
Alert	TA	None
<b>Separation at CPA</b>		
Reported	150ft V/150ft H	Not seen
Recorded	500ft V/0.3NM H	



**THE AS355 PILOT** reports that they were conducting a railway-points heating survey in and around the Leeds area, and were moving to the next set of points at Keighley, having just completed a section at Cross Hills. They had a Basic Service from Leeds and were outside the airspace by 2NM, at 1600ft altitude, when they got a TAS audible warning "*traffic less than one mile, 7 o'clock, same altitude*". [The pilot of the AS355] (in the right seat), and their task-specialist (left seat) looked over their shoulders and saw an F35 rapidly crossing behind, moving towards their 9 o'clock, at which point the F35 made a turn towards them. [The pilot of the AS355] assumed the F35 was turning away from the Leeds CTR, as it was heading in that direction, and was very close. The task-specialist kept the traffic in sight throughout and called out "*coming straight towards us*". [The pilot of the AS355] quickly descended and turned right to avoid, and they estimate that it passed within 150ft on their left. The whole event was roughly 15-to-20sec from the TAS warning. Once clear, they climbed back up and they saw a second F35, perhaps half a mile away. Leeds Radar then advised them of fast-moving pop-up traffic. They told them that they were visual and had to descend to avoid it. A few seconds later, Leeds Radar asked if they knew what types they were, as they had [reportedly] climbed into controlled airspace.

The pilot assessed the risk of collision as 'High'.

**THE F35 PILOT** reports that they climbed up to 4500ft while aborting their [planned] route due to weather. They ended up 12NM from Leeds, and topped-out at 4500ft. Once they were in VMC again, they descended back into the low altitude structure and away from Leeds. They do not recall coming within noticeable proximity of a light helicopter.

**THE LEEDS BRADFORD CONTROLLER** reports that [the pilot of the AS355] was on a Basic Service and was passed Traffic Information on a pop-up 7001 code. The pilot stated that it was two 'fighters', and had to climb for them to pass beneath [they recall]. There was no mention by [the pilot of the AS355] of an Airprox. All aircraft were operating in Class G [airspace].

**THE SWANWICK MILITARY CONTROLLER** reports that [the F35 formation] was handed-over by Swanwick Mil East to Leeming for a low-level descent.

[During post-event analysis of the radar replay, the F35 formation] was observed to descend into low-level and then disappear from radar. There was a slow-moving contact north-west of Leeds Bradford Airport (LBA) by 10NM, indicating 1900ft, at 1058. Then, there appeared to be another contact (believed to be [part of the F35 formation]) that appeared and merged with the slow-moving contact then proceeding south-west. At the point that the Mode C could be made out on radar, the slow-moving contact was indicating 2000ft when the faster moving contact was indicating 2200ft.

After a few track miles, the contact believed to be [the F35] proceeded in the vicinity of the north-east corner of the Manchester TMA, then turned north-east, climbed through the TMA into LBA airspace. Once in LBA airspace, they tracked north-west and disappeared low level.

The controller perceived the severity of the incident as 'Medium'.

**THE LEEMING SUPERVISOR** reports that they were the Leeming ATC Supervisor when a broken transmission was received at approximately 1100 from [the F35 pilot] pulling-out of low level to the north-west (by approximately 8NM) of Leeds Bradford Airport (LBA). The formation was still wearing a 7001 squawk, climbing through 3500ft and inside LBA airspace. They called the LBA Supervisor to advise them that the formation had called, however, the transmissions were broken. The formation descended and disappeared off the radar display. [The Leeming Supervisor] could not raise [the F35 pilot] and called D&D who were able to make contact.

## Factual Background

The weather at Leeds Bradford was recorded as follows:

```
METAR EGNM 221050Z 26010KT 9999 SCT019 SCT029 13/10 Q0998
```

## Analysis and Investigation

### Leeds Bradford Airport Investigation

[The pilot of the AS355] was operating beneath the Leeds Bradford CTA in Class G airspace under a Basic Service.

Timeline:

- 1058:35 7001 pop-up traffic observed 1NM north of [the AS355]. Due to the proximity of the traffic, the labels were garbled.
- 1058:43 Targets merged. The 7001 indicated 1900ft and [the AS355] 1600ft.
- 1058:53 Targets diverged. [The AS355] indicated 1200ft, the 7001 indicated 1900ft.
- 1059:15 Leeds Radar controller passed Traffic Information on pop-up traffic 2NM south of [the AS355].
- 1059:18 Pilot responded that they established visual sighting of the traffic and had descended to avoid it.

The [AS355] pilot later reported on the RT that they believed that the traffic was a pair of F35s and that they had needed to have descended 500-600ft to avoid them.

Analysis of timings: Traffic Information was not given to [the pilot of the AS355] until the targets had crossed and the confliction was over. The Traffic Information call was made 40sec after the pop-up traffic first appeared on the controller's display. The timings were analysed to determine if there was sufficient time for the radar controller to have passed Traffic Information to [the pilot of the AS355] to have allowed them to have taken timely avoiding action from the point that the unknown traffic first appeared on the surveillance display.

The unknown traffic first appeared 1NM north of the [AS355] at time 1058:35. The targets merged on the next recorded sweep at 1058:43, giving a total elapsed time of 8sec between the target appearing and the contacts merging. Assuming a minimum reaction time of 4sec for the controller to act and respond to the appearance of the contact, the earliest realistic point at which Traffic Information would have been issued was time 1058:39. The time taken for the controller to pass the Traffic Information and the pilot to respond was 13sec. Taking into account the reaction time for the [pilot of the AS355] to analyse the information and take evasive action (a minimum of 4sec), it can be calculated that a minimum time of 21sec would have been required in order for the controller to spot the pop-up conflict, pass Traffic Information and for the aircrew to have responded.

The 8sec available between the pop-up traffic first appearing, to the tracks crossing would be insufficient for the ATCO to have passed timely Traffic Information to allow the [pilot of the AS355] to have taken the required evasive action. The aircrew of [the AS355] acted in accordance with their responsibilities under a Basic Service and sighted the traffic, and took subsequent action to help reduce the risk of collision.

### UKAB Secretariat

An analysis of the NATS radar replay was undertaken. The AS355 could be positively identified from Mode S data. The F35 first appeared on radar at 1058:31 (Figure 1) and could be positively identified several minutes later, after CPA, when the squawk code changed (coincident with the F35 pilot having contacted Swanwick Military at approximately 1112). Both aircraft were depicted on the radar replay as being at Flight Levels. An appropriate conversion factor was used to determine their altitudes. The diagram was constructed and the separation at CPA determined from the radar data.

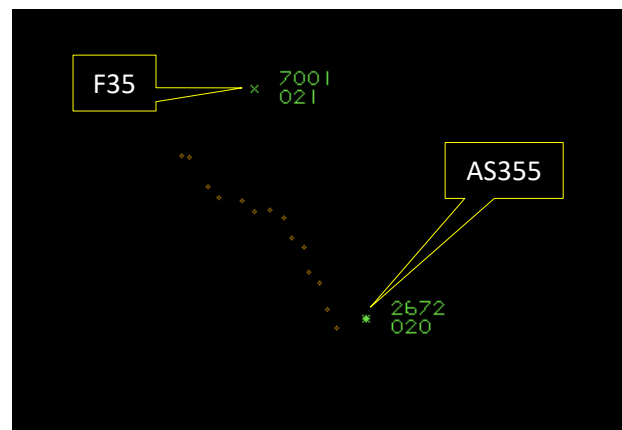


Figure 1 - 1058:31

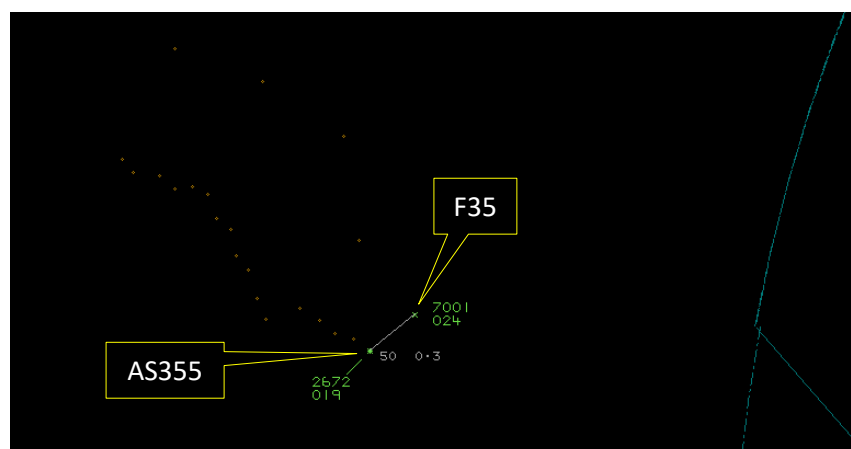


Figure 2 – CPA at 1058:47

The AS355 and F35 pilots shared an equal responsibility for collision avoidance and not to operate in such proximity to other aircraft as to create a collision hazard.<sup>1</sup> If the incident geometry is considered as overtaking then the AS355 pilot had right of way and the F35 pilot was required to keep out of the way of the other aircraft by altering course to the right.<sup>2</sup>

## Comments

### USAFE

During a low-level route weather abort, the crews attempted to call a LARS unit as detailed on their charts. Unfortunately, they were unable to establish two-way communication. A climb was required in order to maintain standards for separation against terrain. During this climb the crew did not recall seeing a helicopter proximate enough to cause concern. Aircraft systems are designed to maximise crew lookout but it would appear that during a climb through a scattered layer of cloud the crew did not see the other aircraft. USAF crews train extensively to the UK military low-flying standards and utilise all deconfliction resources that are available to them to operate safely whilst at low-level.

## Summary

An Airprox was reported when an AS355 and a F35 flew into proximity 1NM north-west of Keighley at 1059Z on Friday 22<sup>nd</sup> September 2023. The AS355 pilot had been operating under VFR in VMC in receipt of a Basic Service from Leeds Radar. The F35 pilot had been operating under IFR in IMC listening-out on the Low Level Common frequency.

## **PART B: SUMMARY OF THE BOARD'S DISCUSSIONS**

Information available consisted of reports from both pilots, radar photographs/video recordings, reports from the air traffic controllers involved and reports from the appropriate operating authorities. Relevant contributory factors mentioned during the Board's discussions are highlighted within the text in bold, with the numbers referring to the Contributory Factors table displayed in Part C.

The Board first considered the actions of the pilot of the F35. An advisor with particular knowledge of the F35 pilot's operation explained that a booking had been made in the Centralised Aviation Data Service (CADS) for a formation of two F35s to operate in LFA17 of the UK Low Flying System (UKLFS). It was further explained that the weather on the day in question had deteriorated and the pilot of the F35 had aborted their planned sortie. Member's attention turned to the area in which the pilot of the F35 had been operating and pondered the options that had been available to them for the most appropriate service. The pilot of the F35 had tried to make contact with the Leeming controller but two-way communication could not be established. Some members wondered whether making contact with the Leeds controller, or to have transmitted a Frequency Monitoring Code (FMC) squawk, had been a preferable alternative due to the proximity of Leeds Bradford controlled airspace. Other members proffered that the pilot of the F35 could have transmitted an emergency squawk given their particular circumstances, but members were in agreement that tuning to the Low Level Common frequency had, on balance, been the most appropriate action. Nevertheless, members noted that the pilot of the F35 had not had situational awareness of the presence of the AS355 (**CF3**) and that it had not been visually acquired (**CF5**).

Members next turned their attention to the actions of the pilot of the AS355. A member with particular knowledge of low-level helicopter operations explained that the task in hand had involved periods of flight at low altitude interspersed with transits at a higher-level as they moved between operating areas.

Members agreed that the pilot of the AS355 would not have expected to have received Traffic Information whilst in receipt of a Basic Service from the Leeds controller. However, it was also agreed that they would have been unlikely to have garnered any awareness of the traffic situation under a higher level of service during their periods at low altitude due to the masking of transmissions by terrain.

---

<sup>1</sup> (UK) SERA.3205 Proximity. MAA RA 2307 paragraphs 1 and 2.

<sup>2</sup> (UK) SERA.3210 Right-of-way (c)(3) Overtaking. MAA RA 2307 paragraph 14.

Notwithstanding, members noted that the EC equipment fitted to the AS355 had detected the presence of the F35 and had alerted the pilot accordingly (**CF4**). Members assessed that the situational awareness of the F35, afforded by the TAS alert, had been acquired late relative to the significantly faster airspeed of the F35 and the consequent rapid closing speed (**CF3**). Nevertheless, the alert had prompted a lookout and members commented that it had been a 'good spot' of the F35. Members acknowledged that the proximity of the F35 had caused considerable concern (**CF6**) and commended the decisive action taken by the pilot of the AS355 that had increased separation between the aircraft.

The Board next considered the actions of the Leeds controller. Members concurred with the findings of the Leeds Bradford Airport unit investigation that concluded that there had been insufficient time for the Leeds controller to have noticed the F35 'pop-up' traffic on radar and to have passed Traffic Information to the pilot of the AS355. In the context of the brief moment in which the Airprox had occurred, members assessed that the passage of Traffic Information on the F35 had been late (**CF1**), but members were in agreement that there had been little else that the Leeds controller could have done to have ameliorated the situation.

Concluding their discussion, members summarised their thoughts. It was agreed that the pilot of the F35 had not had situational awareness of the AS355 nor had it been visually acquired. It was also agreed that the Leeds controller had not had situational awareness of the F35 until such a time that it had been too late to have passed Traffic Information to the pilot of the AS355. Consequently, members felt that the safety margins in this scenario had been degraded. However, members were in agreement that, upon visual acquisition of the F35, the pilot of the AS355 had reacted quickly to increase separation to avert a risk of collision. The Board assigned Risk Category C to this event.

**PART C: ASSESSMENT OF CONTRIBUTORY FACTORS AND RISK**

Contributory Factors:

	2023222			
CF	Factor	Description	ECCAIRS Amplification	UKAB Amplification
<b>Ground Elements</b>				
<b>• Situational Awareness and Action</b>				
1	Human Factors	• ANS Traffic Information Provision	Provision of ANS traffic information	TI not provided, inaccurate, inadequate, or late
2	Human Factors	• Conflict Detection - Detected Late	An event involving the late detection of a conflict between aircraft	
<b>Flight Elements</b>				
<b>• Situational Awareness of the Conflicting Aircraft and Action</b>				
3	Contextual	• Situational Awareness and Sensory Events	Events involving a flight crew's awareness and perception of situations	Pilot had no, late, inaccurate or only generic, Situational Awareness
<b>• Electronic Warning System Operation and Compliance</b>				
4	Contextual	• ACAS/TCAS TA	An event involving a genuine airborne collision avoidance system/traffic alert and collision avoidance system traffic advisory warning triggered	
<b>• See and Avoid</b>				
5	Human Factors	• Monitoring of Other Aircraft	Events involving flight crew not fully monitoring another aircraft	Non-sighting or effectively a non-sighting by one or both pilots
6	Human Factors	• Perception of Visual Information	Events involving flight crew incorrectly perceiving a situation visually and then taking the wrong course of action or path of movement	Pilot was concerned by the proximity of the other aircraft

Degree of Risk: C.

### Safety Barrier Assessment<sup>3</sup>

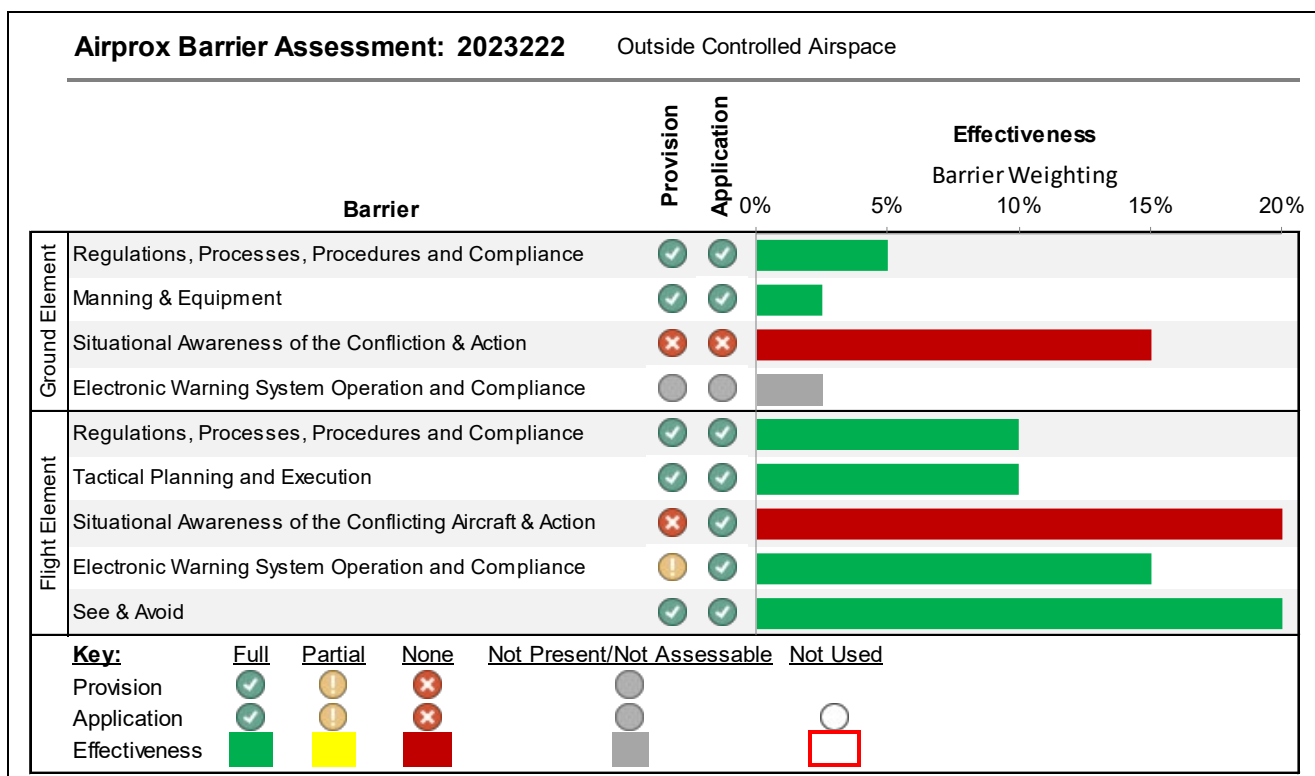
In assessing the effectiveness of the safety barriers associated with this incident, the Board concluded that the key factors had been that:

#### Ground Elements:

**Situational Awareness of the Confliction and Action** were assessed as **ineffective** because the Leeds Bradford controller had not had sufficient time to have passed Traffic Information on the F35 to the pilot of the AS355.

#### Flight Elements:

**Situational Awareness of the Conflicting Aircraft and Action** were assessed as **ineffective** because the pilot of the F35 had not had situational awareness of the presence of the AS355.



<sup>3</sup> The UK Airprox Board scheme for assessing the Availability, Functionality and Effectiveness of safety barriers can be found on the [UKAB Website](#).